Geodetic Observation of Postglacial Rebound: Constraints on Mantle Viscosity

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We integrate geodetic observations from the Global Positioning System into our published analysis [Argus et al., 1999] of glacial isostatic adjustment based on very long baseline interferometry and satellite laser ranging. Motions reflecting the isostatic adjustment of the solid earth to unloading of the late Pleistocene ice sheets are distinguished from plate motions by first estimating plate rotations and then attributing outstanding intraplate deformation to glacial isostatic adjustment. Sites that were along the margins of the ice sheets during the last glacial maximum are observed to move laterally away from the ice centers at < 1.5 mm/year, in disagreement with the moderately fast motions predicted by the model of Peltier [1996]. We explore the constraint this observation provides on lithospheric thickness and the radial profile of mantle viscosity.

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Peltier, W. R., Mantle viscosity and ice-age ice sheet topography, Science 273, 1359–1364, 1996.